Experimental and numerical plasticity analysis of heterogeneous welds

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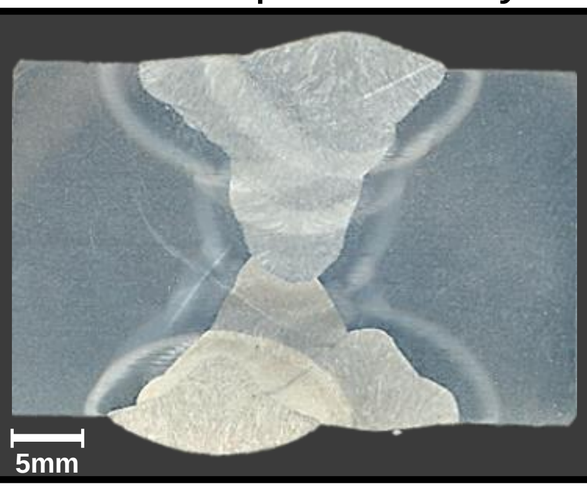
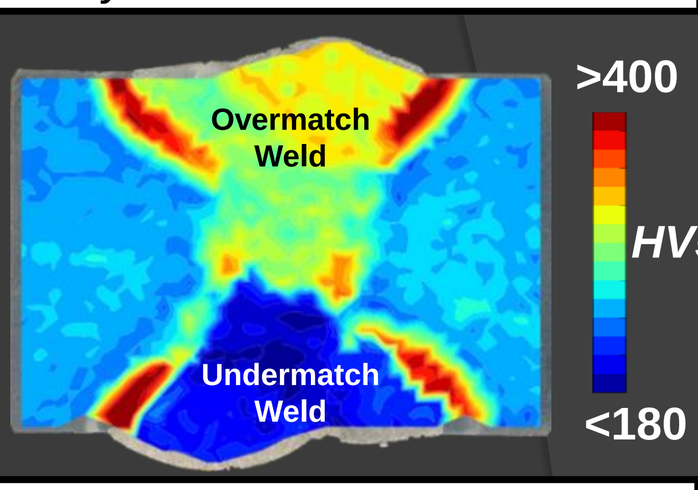
Welded structures might fail due to large deformations

Welds with intentional high degree of heterogeneity have been produced by University of Maribor



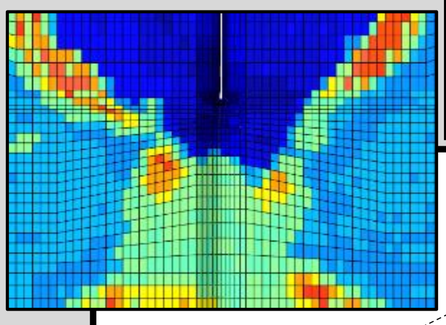


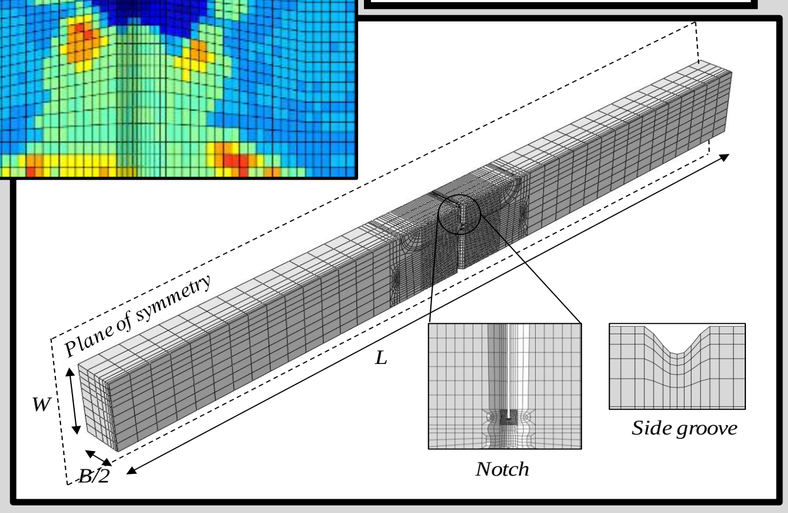
Quantification of weld heterogeneity using hardness map

Analysis of plastic deformations plays an important role in assessment of limit loads

Numerical analysis

Material properties assigned from HV maps





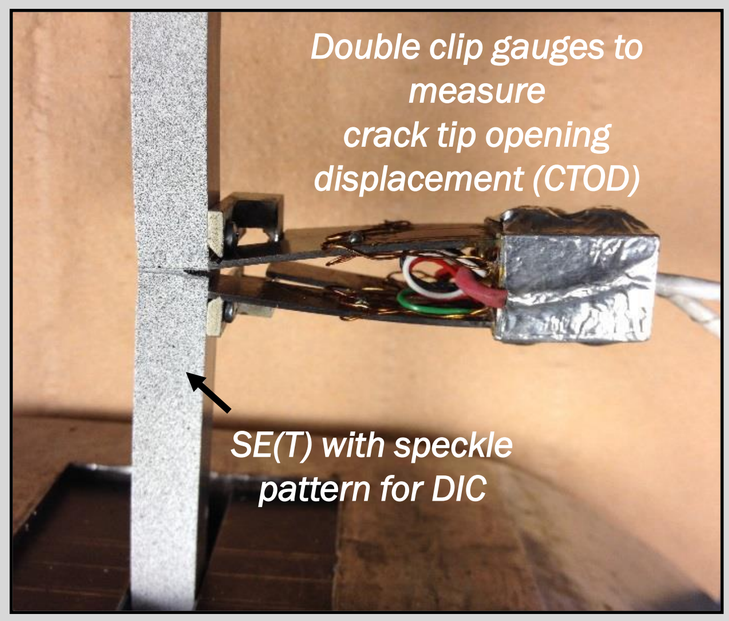
Finite element model having complex strength heterogeneity

Single edge notched tension (SE(T)) tests

Mutual validation

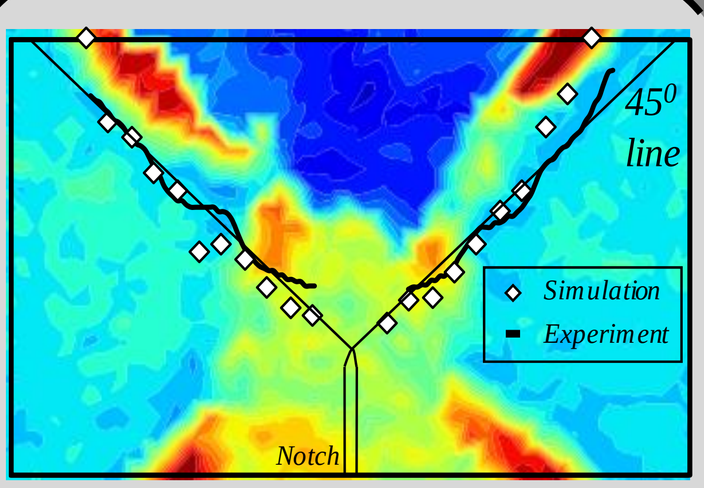
Full-field strain analysis to derive paths of **maximum equivalent strain**

Experimental analysis



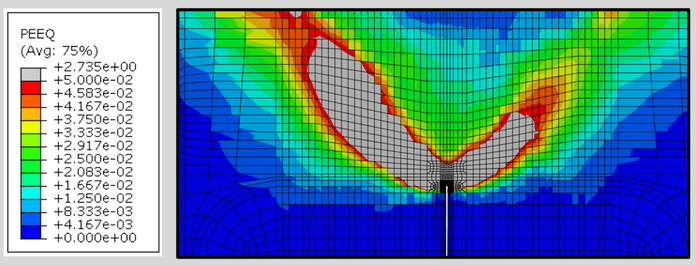
Digital Image Correlation (DIC) used to acquire deformations

Numerical results show good agreement with experiments

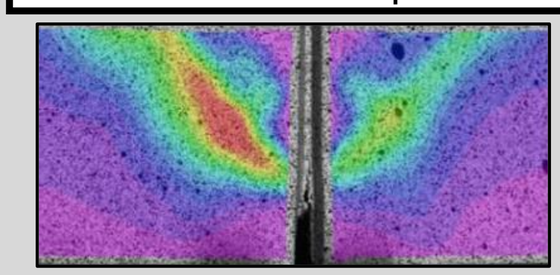


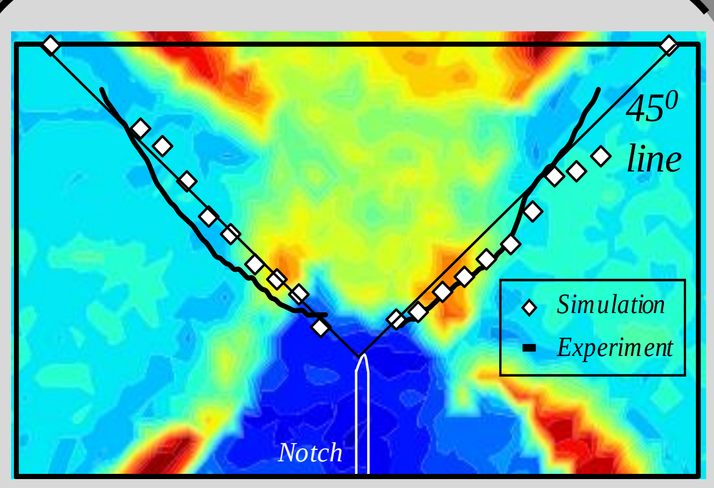
SE(T) test for notch located in Overmatching region

Plastic strains in simulations



Plastic strains in experiments





SE(T) test for notch located in Undermatching region

Study offers insight to include weld heterogeneity in simplified integrity assessment

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